REMARKS

This is a full and timely response to the Office Action mailed April 1, 2004.

By this Amendment, claim 1 have been amended to incorporate the subject matter of claim 8, and claim 10 has been amended to overcome the rejection under 35 U.S.C. §112. Claims 8 and 19-21 have been canceled without prejudice or disclaimer to their underlying subject matter. Support for these claim amendments can be found variously throughout the specification, see for example, the original claims. Claims 1-7, 9-15 and 18 are pending.

In view of this Amendment, Applicant believes that all pending claims are in condition for allowance. Reexamination and reconsideration in light of the above amendments and the following remarks is respectfully requested.

Rejections under 35 U.S.C. §112

Claim 10 is rejected under 35 U.S.C. §112, second paragraph, for alleged indefiniteness. Applicant respectfully traverses this rejection.

However, in order to expedite prosecution, Applicant has amended claim 10 to recite "*a mixed gas which substantially comprises nitrogen gas at normal pressure and CO gas*" which the Examiner has indicated to be acceptable.

Thus, in view of these amendments, withdrawal of this rejection is respectfully requested.

Rejections under 35 U.S.C. §102 and/or §103

Claims 15 and 18 are rejected under 35 U.S.C. §102(b) as allegedly being anticipated by or, in the alternative, under 35 U.S.C. §103(a) as allegedly being obvious over Kimmel et al. Applicant respectfully traverses this rejection.

In reviewing the Office Action, the Examiner has not responded to Applicant's arguments of March 5, 2004 (with respect to claims 15 and 18) and has instead reiterated his reasons for rejection previously set forth in the Office Action dated November 7, 2003. Applicant believes that the Examiner's lack of response is improper since, under §707.07(f) of the Manual of Patent Examining Procedure, the Examiner must, if he or she repeats the rejection (*when Applicant traverses any rejection*), take note of the Applicant's argument and ***answer the substance of it***. Since, in this case, the Examiner has not answer the substance of Applicant's arguments, the Examiner is required to either withdrawal this rejection or respond directly to the points raised in our arguments ***in a new office action***.

As stated previously, Kimmel's process is substantially different than that of the

present invention. The claimed process for producing a tungsten carbide powder comprises the steps of:

(a) mixing an aqueous ammonium tungstate solution with a carbon powder in a proportion to reduce and carburize ammonium tungstate to form a slurry,

(b) drying the slurry to prepare a precursor,

(c) subjecting the precursor to a reduction and carburization by heating to a temperature, at which a reduction and carburization proceeds, in a non-oxidizing gas atmosphere to form a reduced and carburized product,

(d) mixing the reduced and carburized product with a carbon powder in a proportion required to carburize a W_2C component and/or a W component in the reduced and carburized product into WC, and

(e) subjecting the reduced and carburized product mixed with the carbon powder to a carburization by heating to a temperature, at which a carburization proceeds, in a hydrogen atmosphere.

Other aspects of the claimed process include (1) the ammonium tungstate in step (a) comprising a purity of at least 99.9% (preferably 99.99%) by weight based on the content of tungsten in the total metal component of said solution, (2) the carbon powder in steps (a) and (d) comprising a purity of at least 99.9% (preferably 99.99%) by weight, (3) the concentration of the aqueous ammonium tungstate solution in step (a) being within a range of 20-70% by weight, and (4) the slurry in step (b) being dried at a drying temperature of not more than 350°C.

Based on our review of Kimmel, many of the process limitations set forth in the claims are not taught or suggested in the reference. Kimmel teaches a conventional process for producing a tungsten carbide powder which is generally described on page 2, lines 13 to page 3, line 4, of the specification. Kimmel discloses mixing ammonium tungstate with carbon powder and milling the mixed powder (see column 3, lines 53-56 of Kimmel). This is followed by reduction at a temperature of greater than 878°C in a N_2 and CO gas atmosphere, and further carburization at a temperature of about 1200°C in a hydrogen atmosphere (see column 3, line 57 to column 4, line 32). Thus, Kimmel does not at all teach mixing an aqueous ammonium tungstate solution with a carbon powder at a concentration of 20-70% by weight to form a slurry and drying the slurry at a drying temperature of not more than 350°C to prepare a precursor.

In addition, Kimmel discloses mixing the ammonium tungstate and carbon powders with a blender and a ball mill (see column 3, lines 53-56, and column 4, line 9-11, of

Kimmel) which teaches away from the present invention. As stated on page 7, lines 15-18, of the specification, the process of the present invention does not require any mechanical milling step which means that the contamination by metal impurities from the milling step can be avoided.

Still further, Kimmel teaches away from using an aqueous solution by stating that "*Tungsten particle growth is affected by water vapor deposition reaction which occurs in the reduction powder bed*" (see column 1, lines 51-53, of Kimmel).

Thus, given that Kimmel does not at all teach the process of the present invention, one skilled in the art cannot reasonably expect the tungsten carbide powder of Kimmel et al. to comprise the claimed particle size, tungsten content and impurities of claim 15 and the tungsten carbide powder of claim 18.

As discussed in the specification, contamination by metal impurities such as iron, cobalt, nickel and chromium from stainless steel containers and cemented carbide balls during mixing (via blender or ball mill) cannot be avoided in Kimmel's process. As a result, it becomes impossible to maintain a ammonium tungstate and carbon purity of 99.9% or higher. Further, coarse WC particles are locally produced during reduction and carburization by the influence of these metal impurities. Still further, when using a powder containing the coarse WC particles as a raw material, a reduction in strength is likely to be caused by the coarse WC particles as origins of fractures. Therefore, it is difficult to produce a high-performance fine tungsten carbide powder using the process disclosed in Kimmel.

It should also be noted that Kimmel does not teach or suggest either expressly or inherently a tungsten carbide powder comprising the content of nitrogen and that of oxygen in crystal lattices being respectively within a range of 0.08-0.20% by weight and 0.10-0.35% by weight and a lattice constant of an a-axis and that of a b-axis being respectively within a range of 0.29020-0.29060 nm and 0.28380-0.28420 nm.

Thus, for these reasons, withdrawal of this rejection is respectfully requested.

Claims 15 and 18 are rejected under 35 U.S.C. §102(b) as allegedly being anticipated by or, in the alternative, under 35 U.S.C. §103(a) as allegedly being obvious over JP '900. Applicant respectfully traverses this rejection.

To constitute anticipate of the claimed invention, a single prior art reference must teach each and every limitation of the claims. Based on our review of JP '900, it is clear that this reference does not expressly or inherently teach the content of tungsten, nitrogen and oxygen recited in the claims or the lattice constant.

Thus, withdrawal of this rejection is respectfully requested.

If the Examiner disagrees with the Applicant's arguments, the Examiner is respectfully requested to point out where in JP'900, the limitations of claims 15 and 18 are taught.

Claims 1-7, 9-15 and 18 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Martorana. Applicant respectfully traverses this rejection.

However, in the interest of expediting the allowance of rejected claims 1-7, 9-14 and 18, Applicant has amended claim 1 to incorporate the limitations of non-rejected claim 8 which overcomes this rejection with respect to such claims.

With regard to claim 15, Applicant strongly disagrees with the Examiner's position set forth in the action. To constitute anticipation of the claimed invention, the cited reference must teach each and every limitation of the claims. Here, in this case, Martorana only teaches a process for producing a tungsten carbide powder having an average particle diameter of 10μ (see page 5, line 4, of Martorana) which is much higher than that of the present invention (an average particle size as measured by the Fischer Subsieve Sizer process of 0.8 μm or less). Further, the reference also does not teach the claimed limitations (1) a maximum particle size in a particle size distribution as measured in accordance with ASTM B430-79 of 1 μm or less, (2) the content of tungsten based on the component excluding a non-metal component being at least 99.9% by weight, (3) the content of nitrogen and that of oxygen in crystal lattices being respectively within a range of 0.08-0.20% by weight and 0.10-0.35% by weight and (4) a lattice constant of an a-axis and that of a b-axis being respectively within a range of 0.29020-0.29060 nm and 0.28380-0.28420 nm.

Thus, withdrawal of this rejection of claim 15 is respectfully requested.

CONCLUSION

For the foregoing reasons, all the claims now pending in the present application are believed to be clearly patentable over the outstanding rejections. Accordingly, favorable reconsideration of the claims in light of the above remarks is courteously solicited. If the Examiner has any comments or suggestions that could place this application in even better form, the Examiner is requested to telephone the undersigned attorney at the below-listed number.

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Respectfully submitted,

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